

Service Manual

CS 720/721

Manual Cartwasher



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**Operating, Diagnosis, Technical
and Schematic Manual**

Belimed
Infection Control

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1. Introduction

1.1 Copyright Notice

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1.2 Explanation of Symbols

Throughout this manual one or more of the following symbols may be found. They have been placed to bring attention to the areas of the manual which may cause harm or damage to individuals or the machine if proper safety procedures are not followed. Proper safety procedures should be followed at all times while working on the equipment.

1.2.1 Caution Symbol



In this manual you will find this symbol in connection with all safety directions in which body and life of persons could be in danger. Follow the rules and especially carefully in these cases. Pass on these safety directions to other users. Apart from the directions in this manual, the generally accepted rules of safety and prevention of accidents must be observed.

1.2.2 Attention Symbol



This symbol will be found in this manual when it is important to emphasize that rules, procedures, directions and the correct sequence of working steps are to be followed to prevent damage and destruction of the machine.

1.3 General Information

1.3.1 General Precaution

ATTENTION

Please read this manual carefully before setting up the machine. Only personnel who read the operating instructions and safety precautions should operate, maintain or repair the machine.

No liability will be accepted in respect of damage occurring to the machine by non-compliance with these instructions. These instructions only refer to this Belimed CS 720 machine. **Belimed reserves the right to make technical changes, which improve the operation, maintenance or safety of the equipment.**

1.3.2 Description of the Belimed CS720

The Belimed CS720 is a single chamber machine. The washing and drying chamber is constructed primarily of polished stainless steel. All interior panels and components are stainless steel and are well insulated with 1.5" of fiberglass insulation. Each panel is covered with a steel panel on the exterior to protect the insulating material and reduce unwanted noise. The wall sections transfer heat at the rate of 8,200 BTUs at the chamber sides. All associated hardware to attach the panels and other structures are stainless steel. All welds on the chamber and other components are dressed and polished to a matched finish. Each cartwasher has a tilt mechanism installed to allow for liquid draining during the wash, rinse and dry cycles. All components that can be harmed by the chamber environment are mounted to the exterior of the chamber. Mounted in the top of the chamber is a glass window for illumination of the chamber. A light is mounted on the exterior away from harmful vapors and shines through the window. The Supply cabinet mounted to the exterior chamber wall, in the supply room, houses all the electrical components and process control unit needed to operate the Belimed CS 720.

The Belimed CS 720 is installed between the clean and the unclean sides in a 5" pit to allow for loading level with the finished floor.

The Belimed CS 720 is equipped with two pairs of bi-folding doors. One each at the load and unload ends of the chamber. All doors are constructed of polished stainless steel inside and out. They are fitted with rigid foam insulation between the panels and welded together to form a sealed door. The doors effectively control heat transfer to 2,800 BTUs at the entrance and exit. Each bi-folding section contains a 7.5" round window of tempered glass for clear visibility through the washer. Attached stainless steel shafts and a guide track mounted to the chamber, guides the door's leading edge. The doors are opened and closed via a pneumatic piston. The piston rotates a solid 1" shaft at the exterior of the chamber, which is mounted vertically through the entire door and protrudes through to the exterior of the chamber. The door's opening and closing are controlled by the process control. Care

has been taken to ensure that only one door can be opened at any one time In accordance with Hospital guidelines as published in “Guidelines for Design and Construction of Hospitals”. This publication states that the Decontam room shall be physically separated from all other areas of the department. If the doors remain open, cross contamination is allowed and the airflow balance is disrupted. If any of the folding doors are not tightly closed, the process control will prevent the start of a program.

1.3.3 Design Features

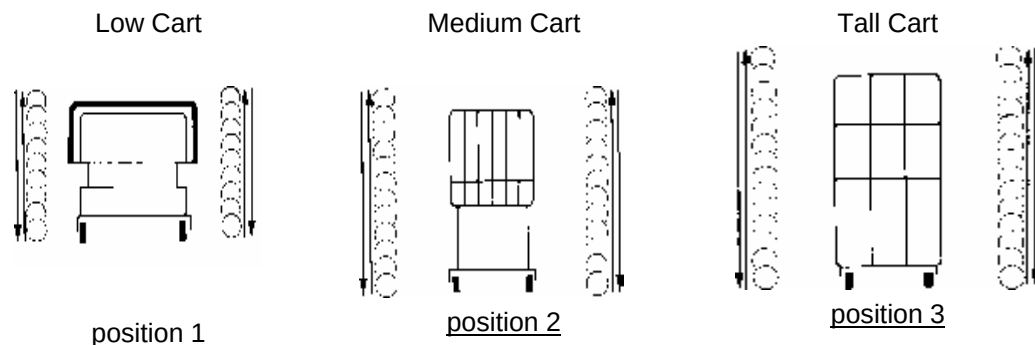
Chamber Design: The Stainless Steel pan is self-supported without seams to protect against leaks. The roof is designed as a ridged structure to support the additional components. The stainless steel ceiling is pitched to avoid accumulation of water droplets. External surfaces, roof and sides, are insulated with fiberglass and covered with galvanized steel sheeting.

Supply Tank: This separate unit consists of a tank, insulated on all sides and a circulation pump made of stainless steel. The wash water is heated inside the supply tank by a steam coil and control valve. A built in overflow skims the surface water as it is returned during the wash and rinse cycles.

Rinse Heat Exchanger: The rinse water is heated inside the tubular heat exchanger by a steam coil and control valve. Hot water passes through the heat exchanger during the rinse cycle to super heat the loaded carts and rinse away residues from cleaning.

Liquid Return Pump: A self-priming vertical pump made of stainless steel allows a rapid and complete return of the washing liquid and rinse liquids out of the chamber and back to the supply tank for re-circulation

Spray Ring: The spray ring consists of 2 rings provided with spray nozzles. The bottom ring for washing and the upper ring for rinsing. The spray ring moves in a vertical direction. The lift of the spray ring and the number of repetitions (one complete down and up of the ring) for both washing and rinsing is adjustable. The Lift of the spray ring is determined by the height of the carts to be washed. For example:



The motor for the spray ring is located on the chamber ceiling. If the spraying frame gets blocked in its upward or downward movement a safety switch stops the movement of the spray ring to prevent damage to carts.

Chemical Dosing Unit: The Belimed CS 720 is equipped with two chemical additive pumps that are located in the supply room and draw chemical through a poly-braid hose to the pump and then eject the chemical under pressure into the supply tank and rinse water. The chemical pumps are equipped with low-level sensors for the chemical additive. When the chemical additive is low the status will be displayed at the master control. The pumps can be adjusted directly at the pump and controlled further by timers in the process control software.

Pneumatic Unit: All the valves and regulators required for the pneumatic operation of the machine are mounted on a manifold that is easily accessible. The valves can be controlled manually at the valve and electronically through the service mode.

Exhaust Equipment: The air exchange within the chamber is carried out by a radial exhaust fan on the chamber ceiling. The fan has two operating speeds. The fan draws out excess vapors during the wash and rinse steps and maintains negative pressure within the chamber at low speed. In the dry step air is drawn in across a air heat exchanger to dry the carts. The removal of all vapors is accomplished before program completion.

Tilt Mechanism: By means of pneumatically driven cylinders mounted on the chamber roof the traveling rail pallet can be brought into an inclined position during both wash and dry programs. The inclined position prevents formation of water puddles on flat cart surfaces and increases the drying effect.

Process control:

Stored-program control

8 megabytes flash memory

Handling time 2.5 ms

RS 485 / RS 232 - user interface

Safety switching (cycle monitor in case of programs fault)

80 inputs/76 outputs

3 factory stored wash and disinfecting programs

Service Mode for checking the inputs and outputs

Adjustable programs by means of the touch-screen

System Cycle Counter

640 x 480 pixel touch-screen

Program Indication

Fault indication

1.4 Intended Use



The Belimed CS 720 is designed for the washing of, transport carts, case carts and the like. Any other usage is not recommended.

Belimed will not warrant for any damage resulting from misuse; this risk is the responsibility of the user.

The Belimed CS 720 is designed to automatically wash, rinse, and dry a variety of different carts. The Belimed CS 720 has been carefully designed to last for a period of twelve years or longer without the need for major renovation or modification. With proper maintenance, the Belimed CS 720 is a reliable tool in the decontamination process.

1.5 Dimensions

Minimum Clearance Height: 114" / 126"
Minimum Pit Depth: 5"

Model	160/175	160/200	230/175	230/200	270/175	270/200
Net Usable Length	63.0"	63.0"	90.0"	90.0"	106.0"	106.0"
Net Usable Height	69.5"	78.75"	69.5"	78.75"	69.5"	78.75"
Net Usable Width	39.40"	39.40"	39.40"	39.40"	39.40"	39.40"

2. Safety Precautions



- **BURN AND SHOCK HAZARD:** Repairs and adjustments should be attempted only by authorized persons fully acquainted with this equipment. Use of inexperienced, unqualified persons to work on the equipment or the installation of unauthorized parts could cause personal injury or result in costly damage.
- Observe the dangerous voltage labels. Switch off power to machine before opening electrical cabinets.
- **BURN HAZARD:** Allow the machine and its accessories to cool to room temperature before performing any cleaning or maintenance procedures.
- This machine is **NOT DESIGNED TO PROCESS APARATUS CONTAINING FLAMMABLE LIQUIDS.**
- **BURN HAZARD:** All Goods coming out of the dryer will be **HOT TO THE TOUCH.** Wear gloves if a cart is to be handled right away.
- **BURN HAZARD:** Exercise extreme caution when crawling on top of the machine. Steam piping might be exposed and burn you. Also the stainless steel ducting might be hot and can burn you.
- **BURN HAZARD:** Holding tanks piping and piping alongside machine are hot and can burn you. Exercise care when walking around tanks.
- **FALL HAZARD:** To prevent falls, keep floors dry around machine in both Clean and Decontam rooms.
- **FALL HAZARD:** Exercise extreme care when going on top of the machine to perform maintenance. The area is restrictive and it is very easy to loose your balance.
- **EXTRANGULATION HAZARD:** Avoid wearing loose clothing like ties when going on top of the machine as there are moving parts that can hurt you.
- **BODILY INJURY:** Use of the machine should be restricted to properly trained personnel.

ATTENTION

- **Never use wire brushes or steel wool on doors and chamber assembly.**
- **Solenoid valves are equipped with a special material, which can be attacked by oils, grease and moisture. When replacing solenoid valves, wipe mounting surfaces clean of oils and use Teflon tape to seal pipe joints.**
- **Keep the loading and unloading areas free from obstruction while unit is operating.**
- **Any alteration of the machine, which affects its operation, will void the warranty and could violate state and local regulations.**
- **Use only original BELIMED replacement parts for maintenance purposes.**
- **Do not use sharp pointy objects to activate the touch screen, serious damage can occur to the touch screen and it will void its warranty.**

3. Technical Data

3.1 Utility Requirements

Steam connection at the wash liquid tank:	1.0"
Steam connection at heat exchanger:	1.0"
Steam operating pressure:	40-70 PSIG
Steam consumption: (per load)	19 lbs.
Steam Consumption: (per liquid change)	70.5 lbs.
Condensate connection:	3/4"
Compressed Air connection:	1/2"
Compressed Air operating pressure:	100 PSIG
Compressed Air consumption: (per load)	less than 10 CU. FT.
Compressed Air Flow Capacity	25 CFM
Electric connection:	208 V, 60 Hz
Circuit Protection:	50 A
Exhaust air connection:	8" diameter
Relative Exhaust Humidity:	100%
Water (softened) Connection:	3/4"
Water operating pressure:	30-75 PSIG
Water consumption: (per load)	~9.5 gallons
Water consumption: (per liquid change)	92 gallons
Water flow-rate:	min. 8 GPM
Drain Connection:	2"

3.2 Utility Connections



Belimed provides an Installation drawing with specific locations for each supply and its associated requirements. Care should be taken to review the demands of all supplies listed on your site specific installation drawing.

3.2.1 Electric Supply

The electric supply connection is located on the control panel. The electrical service should comply with the local building code and be installed accordingly. A service disconnect should be installed within the supply room to avoid feeding power directly to the Belimed CS 720.

3.2.2 Compressed Air

The pneumatic connection is located on the maintenance unit below the electric control panel.

The Belimed CS 720 is equipped with a complete manifold assembly containing the regulator and moisture separator. It is the responsibility of the customer to provide air that is free from oils, water and impurities, which can harm the control valves.

3.2.3 Steam

There are three Steam connection points, one each at the Supply Tank, Rinse Tank and the Air Heat Exchanger.

Steam is required to heat the water used in the machine. Wash water is heated in the supply tank and rinse water is heated within a *tube bundle type* heat exchanger. Steam is also required to heat the air for drying.

It is the ***responsibility of the customer to provide dry steam free from solid particles and de-watering traps prior*** to the machine connection point.

The steam is piped into stainless steel coils located in the machine supply tank, air heat exchanger and the rinse supply tank. Condensate is returned to the building supply through a steam trap located at the outlet of the machine steam coils. No live steam enters the machine. The heat transfer from the steam coil to the surrounding water and/or air in the heat exchangers accomplishes heating of the water and air.

Proper functioning of the steam heating system is essential for proper operation of the Belimed CS 720.

3.2.4 Drain

Good drainage is essential for proper operation of the machine. The drain connection size for the machine is 2". The machine circuitry is designed for very rapid draining of the sump contents through a 2" valve. The building drain should incorporate its own trap or siphon for odor control and to comply with local code and be of a diameter larger than 2".

3.2.5 Exhaust

In the Belimed CS 720 Washing and Rinsing and Drying are accomplished in the same chamber.

During the washing and rinsing cycles (1 to 2 minute duration for most wash programs) vapor will form as the water temperature rises (maximum design temperature = 200 °F or 93 °C). The exhaust fan runs at low speed and draws the vapors out of the chamber and into the exhaust vent and attached ducting. Depending on duct environmental conditions (air temperature, air velocity, and relative humidity) some of these vapors will condense in the exhaust ducting.

To prevent leakage of condensate out of duct joints, proper ducting and sealing techniques must be complied with. Horizontal runs of duct directly from the machine should be pitched back to the machine to allow potential condensate to drain back. The machine is furnished with an exhaust condensate line that will remove condensate under most conditions. Its design features an 8" stainless steel exhaust pipe outlet, which must be adapted to a 10" pipe, such that condensate that forms due to the diameter expansion can drain into a 3/8" nipple, which is connected by tubing to the machine drain. ***Recommended ducting materials*** are stainless steel, polyethylene or galvanized steel pipe. Aluminum is not recommended for the first few feet prior to connection into larger ducts carrying additional air, because of possible pitting and sealing problems.

During the drying phase (8 to 12 minutes duration for most wash programs) the exhaust fan runs at high speed. The incoming air is suctioned through intake channels, and across a steam powered heating element and into the machine chamber, then across the washed goods.

3.2.6 Water

The Belimed CS 720 is equipped with two water solenoid valves. It is the *responsibility of the customer to install service valves, back flow and fine particle strainers* in each water connection. Belimed only provides the automatic on/off valve controlled by the Belimed CS 720. Fine strainers are required to prevent the lodging of small solids in the orifice of the water solenoid valves and thus decrease the water flow rate or render the solenoid valve non-functional. Small solids lodged in the solenoid valve orifices prevent proper closing of the solenoid valve and can thus lead to overflow of the machine and flooding. Belimed makes available for sale water strainers with see-through indicators to show any trapped solids and to indicate the need for cleaning. Water is used to wash and rinse in all cycles. Hot water contributes to faster program cycles because it reduces the time needed for the machine heater to pre-heat the water. It is required that water be softened to bring its hardness below 90 ppm = 5 grains/gal.

Hardness in wash water (usually in form of calcium and magnesium) affects performance in two ways:

1. It requires considerably more detergent, since much of the detergent is used to neutralize the water hardness and thus not available for cleaning.
2. Water hardness tends to chemically change with heat such that it becomes non-soluble in water and thus deposits on the interior walls of the wash chamber and on the heating coils (i.e. "tea kettle effect"), which impair the heating and drying capabilities of the machine.

3.3 Emissions

Noise Level:	max. 70dB (outside mechanical room)
Heat Radiation in Mechanical Room:	8,200 BTU/hr
Heat Radiation at Entrance:	2,800 BTU/hr
Heat Radiation at Exit:	2,800 BTU/hr
Total BTU:	13,800 BTU/hr
Exhaust, during Wash:	max. 250 SCFM
Exhaust, during Dry:	max. 820 SCFM
Exhaust Air Temperature:	max. 120°C

All above based on factory settings.

4. Installation

4.1 Introduction

Installation of the Belimed CS 720 must be performed by Belimed Technicians as they have received detailed training on all aspects of the installation, assembly, and maintenance of the Belimed CS 720. Belimed is involved in every installation in order to be able to insure the warranty of the system for the accepted duration.

4.2 Installation Drawing

Belimed provides each customer an installation drawing for each project. The Installation drawing should be used to prepare the site in advance of the installation date. The Installation drawing will show any necessary modifications to an existing site and specify the final location of all utilities as required by the Belimed CS 720.

4.3 Installation Considerations

4.3.1 Loading Dock

During the unloading process it will be necessary to park a 20' container at the loading dock for approximately 4 hours. The loading dock needs to be of level height with a normal delivery truck. If a loading dock is not available, a forklift must be provided.

4.3.2 Space Considerations

A clear path from the loading dock to the installation site is required to move the components. The largest piece is 6"x63"x99.5". Please confirm a safe route is available for this item.

If the unit is not going to be assembled at the time it is delivered then ample storage space for the equipment must be provided. The minimum storage area required is 150 square feet and should contain a minimum of 33 linear feet of wall space. This area will also be used as a staging area during the installation.

4.3.3 Service Power Outlet

One convenience outlet (110/120V) is required for installation and servicing of the equipment and the use of power tools.

5. General description of the components and functions

5.1 Overview

Figure 5-1 shows the main components or control elements that are accessible to the user from the Decontam side or entrance of the unit. The control panel is mounted in the enclosure near the Decontam side door.

Insert picture, Isometric view of front of CS 720.

Arrows pointing to control panel, door, EMO

TO BE INSERTED AFTER INSTALLATION

Figure 5-2 shows the main components and control elements that are accessible from the Clean Side or exit of the unit.

Insert picture, Isometric view of clean side of CS 720.

Arrows pointing to control panel, door, EMO

TO BE INSERTED AFTER INSTALLATION

5.2 Indicators and Gauges

The process control indicators are located within the display on the control panel. Scrolling through the appropriate screens allows access to the various indicator readings.

The service gauges are all located within the supply room area.

5.3 Operating Control Panel

All functions and the testing of the inputs and outputs can be accessed from the control panel. The control panel has a color touch-screen, size 117mm x 90 mm (4.6" x 3.5"), 320 x 240 pixels, that displays context sensitive screens with context sensitive buttons, as well as a lower line showing a multi-colored cube and date and time. The screen displays along with the button values, descriptions and their functions are described further through out this section.

There is a multi-colored cube in the lower left corner of the screen that is displayed at all times, along with the date and time.

Pressing the multi-colored cube will bring up three additional buttons in the same row, the function of which is as follows:

SYSTEM:	Set system date and time (see section xxx)
HELP:	Brings up context sensitive electrical schematics
MENU	See below.

All other buttons are not used!

Touching the **MENU** button brings up a choice of buttons.

Touching "**Passwords**" allows someone to access the service menu by entering a password.???

All other buttons are not used!

5.4 Emergency Stop Buttons

There is a number of large emergency stop buttons mounted throughout the Belimed CS 720. These buttons are for protection. Activation of any one of these switches will deactivate certain components as described below and cause the appropriate "FAULT – EMERGENCY STOP" screen to come up on the main display. The Emergency Stop Switch that was pushed will need to be reset before the machine can resume activity.



The Belimed CS 720 is equipped with **4 Emergency Stop Buttons**. They are described as follows:

1. **Main Control Panel (DS Door) (1 each):**
2. **Inside Wash/Dry Chamber (2 each):**
3. **CS Door Control Panel (1 each):**

Pressing any one of these switches will deactivate the following components:

All Doors:	De-energized
Main Wash Pump:	De-energized
Spray Ring Motor:	De-energized
Dryer Fan/Heater:	De-energized

5.5 Chemical Dosing Unit

The Belimed CS 720 is equipped with two chemical additive pumps that are located in the supply room and draw chemical through a poly-braid hose to the pump and eject the chemical under pressure into the supply tank and rinse water. The Chemical pumps are equipped with a low-level sensor for the chemical additive. When the chemical additive is low an audible alarm will sound and status will be displayed at the master control. The pumps can be adjusted directly at the pump and controlled further by timers in the process control software.

5.6 Door Operation

The Belimed CS 720 has two bi-folding door sections. One each at the entrance, and exit of the washer. The door functions are controlled primarily by the process control. In SERVICE mode the door functions can be accessed from the control panel.

6. Operation



6.1 General Precautions

- Please note orientation of door opening before loading carts into the chamber. Door opening should be toward the wide-track side.
- Carts that have doors should be secured in the open position before loading into the cartwasher
- Drain plugs in cart bottoms should be removed.
- Avoid carts that have lips or edges that can hold liquid.
- Do not place additional items on cart to be washed. These items can roll off in the tipping process and possibly jam or damage the cart and/or washer.
- Cart construction materials should be such that they can be exposed to the machine environment.
- Do not enter the chamber while the unit is operational.
- Keep hands and feet clear of track sections while unit is operational.
- Only trained personnel should perform service on the equipment.
- Processed carts may be hot. Do not touch without protection.

6.2 Turning on the Machine

The main power disconnect switch is located in the supply room on the supply cabinet. This switch disconnects all power to the main control. Under normal operation this switch is left in the "ON" position.

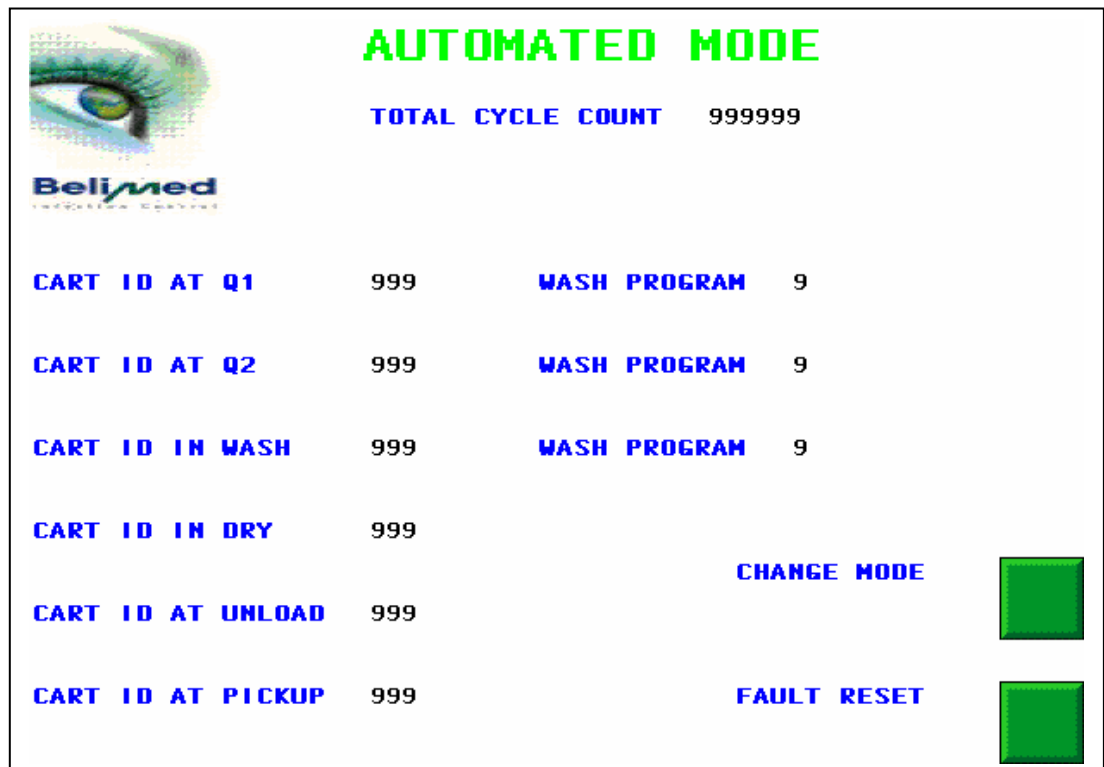


Once the main switch is turned on, the wash tank will begin to heat up to their operating temperatures. The operator display will show the screen **“Machine Not Ready”** and the labeling **“Wash Tank Temperature”** will be in the color red. Once the respective operating temperature is reached, the labeling color will change to green.

6.3 Program Ready

Once the tank temperature buttons have changed to green the display will change to the **“Program Ready”** screen and the Belimed CS 720 will be ready for operation. If the clean side door is open or the spray ring is not in the up position, the **“Machine Not Ready”** screen will remain. The operator can then touch any of the buttons in red in order to place the machine into a state ready for operations, as follows:

- “Close DS Door”
- “Close CS Door”
- “Raise Spray Ring”



6.4 Description of Operation

6.4.1 Wash Chamber

User Interface

The washer has a colored graphic user interface with touch-screen. A complete description is given in Section 5.3???

Spray Manifold

The washer has an oval spray manifold with dual spray circuits, one for wash and one for rinse. This spray manifold is in the Up position, when the washer is not operating. It is lowered, when the wash program begins and travels up and down a programmable height, depending on the selected program

Program information defines 3 parameters:

1. Height of the Cart, which specifies the distance the spray ring drops on program start, before the pump engages, and the height at which it stops and reverses direction on repeated up and down travel. (Water and detergent saving feature)
2. Number of repetitions (complete down and up cycle) for wash
3. Number of repetitions (complete down and up cycle) for rinse

Example: A typical program has one wash repetition, two rinse repetitions and sets a height of 60".

On start the spray ring travels down to 60". At this point the pump engages. The spray ring continues all the way to the bottom and reverses up back to the 60" height.

Upon the 1st wash cycle, the wash pump is turned off, the rinse turned on, and the spray ring lowers to complete 2 down and up rinse repetitions. At the end of the 2nd repetition, the spray ring is raised fully to the up position and the program is ended.

Program time is dependent on the number of wash and rinse repetitions and the program height.

Wash Pump

The wash pump takes wash water containing detergent from the supply tank unit and pumps it through the wash manifold.

Rinse Heat Exchanger

The rinse heat exchanger takes hot water and passes it through a series of coils heating it further. This heated rinse water is sprayed on to the carts. Rinse agent is dispensed directly into the rinse piping. All water (both wash and rinse) falls into the stainless steel pan of the washer.

Vertical Return Pump

The vertical return pump returns the liquid from the washer pan to the supply tank. Excess water is drained from the wash tank through an overflow. Detergent is made up to the wash tank proportionate to the quantity of rinse water added to the tank (timed).

Spray Ring Hoist Motor

The spray ring hoist motor is mounted on a pivoting base with springs and shock absorbers on top of the washer cabin and is equipped with sensors to detect obstruction of the spray ring. On obstruction by the spray ring, a Fault-Spray Ring and a Fault-Wash signal are displayed.

Exhaust Fan

The exhaust fan is mounted on top of the chamber. During normal wash, the fan is operated at low speed. During faults, the exhaust fan is engaged at high speed in order to remove any hot vapors, before the doors are opened.

Air Heat exchanger

As air is exhausted from the chamber. Fresh air is suctioned in from the supply room across the air heat exchanger. Steam is used to heat this air to aid in drying the carts.

Tracks

There are two tracks within the chamber. The tracks are raised to floor height during loading and tilted during the wash cycle to drain water. There is a wheel chock at the end of the track which stops the cart from rolling.

6.4.2 Doors

General

Each system has three doors, the DS Door, Center Door, and CS Door. Doors are pneumatically operated bi-folding doors. The DS and Center Door open (fold) into the wash chamber, the CS door opens (folds) into the dry chamber. Doors are monitored for both fully opened and fully closed positions.

All doors remain normally closed and are opened only for loading and unloading in automatic mode, or on manual key or push button input during fault, service or maintenance mode.

Door Opening Priorities

In automatic mode doors are opened as follows:

CS Door: Upon Dry completion and priority assignment
Center Door: Upon Wash Completion and priority assignment
DS Door: Upon sensor Q2 activation and priority assignment

Priorities are established as follows:

CS Door: Priority 1
Center Door: Priority 2
DS Door: Priority 3

In automatic mode, at least 1 of the 3 doors is always closed.

Door Opening Description

Upon signal to open, the door open cylinder is energized, the door close cylinder de-energized. Once the door open signal is made, the pneumatic **door flapper** is lowered to bridge the gap between conveyor (and track) and the chamber end. The door flapper has channel guides to guide the driven casters.

If the flapper down signal is not made within the specified time, fault signals are set as follows:

CS Door: Fault CS Door, Fault Dry
Center Door: Fault Center Door, Fault Wash, Fault Dry
DS Door: Fault DS Door, Fault Wash

Door Closing Description

Doors are closed as soon as confirmation is made of cart position, as follows:

CS Door: Sensor Unload Position
Center Door: Sensor Dry Position
DS Door: Sensor Wash Position

Upon signal to close, the **door flapper** is raised. Once the **flapper up** signal is made, the door close cylinder is energized and the door open cylinder de-energized. If the **flapper up** signal is not made within the specified time, fault signals are set in the same fashion as described for opening.

Upon a door fault during closing the respective door is set to open. Upon fault during opening, the respective door is de-energized. A de-energized door can be pushed open by hand.

6.5 Program Selection

After a cart has been loaded, the user must select a program on the display screen. Once a program has been selected, the process control will continue to use the program until a new program is selected. After selecting a program, the user then presses the cycle start button to begin the cycle

6.5.1 Factory Pre-set Programs

The Belimed CS 720 is shipped with three factory-selected programs. Each program is adjustable by the user (requires service password) at the control panel. Programs are adjusted by changing the number of repetitions in the wash and rinse cycles and by adjusting the time for the dry cycle. Table 6-1 shows the cycle values or repetitions of the factory programs. Table 6-2 has been provided so the user can keep record of any modified programs.

Table 6-1:

Prog. #	Program Name	# of Wash Cycle Repetitions	# of Rinse Cycle Repetitions	Dry Time	Recommended Load
1	Normal	1	2	145 sec	Normally soiled carts
2	Light	1	1	145 sec	Medium soiled carts
3	Heavy	2	2	145 sec	Heavily soiled carts

6.5.2 User Defined Settings

Use this table to enter any adjustments to factory settings and retain for your records.

Table 6-2:

Prog. #	Program Name	# of Wash Cycle Repetitions	# of Rinse Cycle Repetitions	Dry Time	Recommended Load
1					
2					
3					

6.6 Setting the Program Parameters

Program settings are made from the control panel. They can only be made from the Service Mode. **Proper password authorization is required to access the service mode.** Consult the service manual for the procedure.

6.7 Loading and Unloading

The actual loading and unloading processes are performed by the user. The process control will recognize a completed cycle and automatically open the clean side door. Once the carts have been unloaded, the user closes the clean side door. Once the clean side door is closed the process control will automatically open the Decontam side door in preparation for the next cart.

7. Faults – Intervention and Resolution

7.1 Wash Chamber Faults



Exercise extreme caution to make sure no one else may accidentally engage any part of the machine, while you are correcting faults.

BE CERTAIN THAT ONE OF THE EMERGENCY STOPS IS PRESSED, WHILE YOU ARE IN THE CHAMBER. GRAVE PERSONAL INJURY MAY RESULT, IF THE EQUIPMENT ENGAGES, WHILE YOU ARE INSIDE THE CHAMBER!

When a chamber fault occurs, several causes may be responsible. Depending on the source of the fault trigger, a context sensitive screen will come up.

7.1.1 Spray Ring Blocked.

If the spray ring is blocked by an open cart door or for whatever reason, the “FAULT – SPRAY RING BLOCKED” will come up. Proceed as follows:

1. Press “OPEN DS DOOR” and make sure the door is fully opened and the flapper is lowered completely.
2. Check to make sure it is safe to enter the wash chamber. Press the “**EMERGENCY STOP**” button.
3. Enter into the wash chamber and correct the cause of the fault. Please note that the spray ring may have been blocked on the way up or on the way down. If necessary, press and hold the “**LOWER SPRAY RING**” button or the “**LIFT SPRAY RING**” button, until the spray ring is clear of the obstruction. Note that the spray ring will not operate, while the emergency stop is pushed. You must first reset the emergency stop button and acknowledge the reset on the touch-screen.
4. Once the obstruction has been removed, press and hold the “**LIFT SPRAY RING**” button, until the spray ring is in the top position. The color of the text will change to green, once the spray ring is fully up.
5. If necessary, press and hold the “**ADV. WASH CONVEYOR**” button to advance the cart to its proper position (fully clear of the spray ring front and rear).
6. After making sure that all corrective action has been taken, press and hold the “**CLOSE DS DOOR**” button, until the DS Door is fully closed.
7. Press the button labeled “**RESET FAULT**”. The fault screen will disappear and the normal screen will reappear (Automatic Mode). The wash program will restart.

7.1.2 DS Door.

The **“FAULT – DS DOOR”** screen display is caused by any of the following conditions:

1. The DS Door is not fully closed, after the signal to automatically close the door has been issued by the process control.
2. The DS Door fails to open completely or the DS Door flapper fails to completely lower, after the signal to automatically open the door has been issued by the process control.

Proceed as follows:



1. Inspect the DS Door. If the DS door is not fully open, press “OPEN DS DOOR”. Make sure the door is fully opened and the flapper is lowered completely. If satisfied, proceed to #3.
 2. Push the DS Emergency Stop button. The door and flapper will depressurize and the **“FAULT – EMERGENCY STOP - DS Door”** screen will come up. Remove any obstruction to door or flapper.
 3. Reset (pull) the DS Emergency Stop button. Push the **“RESET FAULT”** button on the touch-screen. Push the **“OPEN DS DOOR”** button on the touch-screen. Make sure the door is fully open and the flapper lowered completely.
 4. After making sure that all corrective action has been taken, press and hold the “CLOSE DS DOOR” button, until the DS Door is fully closed.
 5. Press the button labeled “RESET FAULT”. The fault screen will disappear and the normal screen will reappear (Automatic Mode). The wash program will start.
-
1. Press and hold the “ADV. WASH CONVEYOR” button, if necessary, and the “ADV. Q2 CONVEYOR” button, if the rear caster is in the Q2 conveyor channel, to advance the cart to its proper wash position (fully clear of the spray ring front and rear).
 2. After making sure that all corrective action has been taken, press and hold the “CLOSE DS DOOR” button, until the DS Door is fully closed.
 3. Press the button labeled “RESET FAULT”. The fault screen will disappear and the normal screen will re-appear (Automatic Mode). The wash program will start.

7.1.3 CS Door.

The **“FAULT – CS DOOR”** screen display is caused by any of the following conditions:

1. The CS Door is not fully closed, after the signal to automatically close the door has been issued by the process control.

2. The CS Door fails to open completely or the CS Door flapper fails to completely lower, after the signal to automatically open the door has been issued by the process control.

Proceed as follows:

NOTE: Resolution of CS DOOR FAULTS must be implemented from the clean side!



1. Inspect the CS Door. If the CS door is not fully open, press the “OPEN CS DOOR” button. Make sure the door is fully opened and the flapper is lowered completely. If satisfied, proceed to #3.
2. Push the CS Emergency Stop button. The door and flapper will depressurize and the “**FAULT – EMERGENCY STOP - CS**” screen will come up on the DS Door main display. Remove any obstruction to door or flapper.
3. Reset (pull) the CS Emergency Stop button. Push the “**RESET FAULT**” button on the CS door panel.
4. After making sure that all corrective action has been taken, press and hold the “CLOSE CS DOOR” button, until the CS Door is fully closed.
5. Press the button labeled “RESET FAULT”

7.1.4 Fault - Tank not filling

The Tank not filling fault is set when the sensors within the tank do not recognize a change in water level. This can be caused by a stuck open drain valve, a faulty sensor, and a faulty or closed water valve.

Proceed as follows:

1. Inspect the Tank for water. If the tank is full there is a bad sensor.
2. Using the Service mode screen drain the tank.
3. Correct the problem sensor.
4. Return the machine to Manual mode(exit Service Mode)
5. Press the Fault reset button on the screen.

7.1.5 Supply Tank not heating

The Tank not heating fault is set when the sensors within the tank do not recognize the desired water temperature. This can be caused by a stuck steam valve, a faulty sensor, and a faulty steam trap.

Proceed as follows:

6. Inspect the Tank water for temperature. If the tank is hot there is a bad sensor.
7. Using the Service mode screen drain the tank.
8. Correct the problem sensor.
9. Return the machine to Manual mode(exit Service Mode)
10. Press the Fault reset button on the screen.

7.1.6 Fault –No Water pressure

The Fault - No Water Pressure is set when the pressure sensor does not detect pressure. This can be caused by a water valve that has been closed. A

1. Inspect the Tank water for temperature. If the tank is hot there is a bad sensor.
2. Using the Service mode screen drain the tank.
3. Correct the problem sensor.
4. Return the machine to Manual mode(exit Service Mode)
5. Press the Fault reset button on the screen.

7.1.7 Fault – Emergency Stop?

The Fault emergency stop is activated when one of the various emergency stop switches has been pushed. Before clearing the emergency stop fault, be sure to inspect the machine to determine why it was pressed.

7.1.8 Fault?

8. Maintenance

8.1 Daily Maintenance

8.1.1 Utility Room



WARNING: PRESS EMERGENCY STOP BEFORE PROCEEDING.

- (a) Check air pressure gauge for at least 6 bars (90 psig).
- (b) Drain collected water from water separator of pneumatic unit by squeezing the yellow clamp under the clear plastic bowl. The air supply must be dry. If moisture is present, contact maintenance.
- (c) Listen for air leaks; notify maintenance if you suspect of one.
- (d) Check temperature of the wash liquid and verify it to be at least 65 degrees C during operation.
- (e) Check the chemical levels, Detergent and Rinse agent, replace if necessary.
- (f) Locate the Return Pump and “ Y “ Strainer.

NOTE: Make sure the Wash Chamber floor is empty before proceeding.

You will need an adjustable wrench to loosen up the access nut.

- (g) Remove access nut from “ Y “ strainer located right before the suction side of the return pump and clean the cylindrical filter inside. Make sure that all particles are removed from strainer body. Damage to the pump impeller may occur if debris is allowed to reach the pump. Once clean, reassemble strainer.

8.1.2 Decontam and Clean Room



WARNING: PRESS EMERGENCY STOP BEFORE PROCEEDING.

- (a) Check and if found, remove any obstructions around cartwasher doors.
- (b) Dry any water spillage around the load and unload areas.

8.1.3 Wash Chamber



WARNING: PRESS EMERGENCY STOP BEFORE PROCEEDING.

- (a) Check cabin light, have maintenance replace bulb if necessary.
- (b) Lift the left center screen first by its handle, rotate it 90 degrees and remove. Next remove right screen in same manner. Remove the left and right tapered screens and proceed to remove all debris from channel. When doing so be careful that no particles (screws, nuts, etc.) fall under the suction elbow. Once channel is clean, place screens back in their respective places.

- (c) Check the bottom pan for debris and, if necessary, clean.
- (d) Remove any pan or instrument that may have fallen in the pan or tracks

8.2 Weekly Maintenance

8.2.1 Utility Room



WARNING: PRESS EMERGENCY STOP BEFORE PROCEEDING.

- (a) Remove the supply tank lids to gain access to the filter box. Check whether filter box in the supply tank is dirty and, if necessary, clean. You should only find paper and maybe some very small plastic particles. If any metal particles are found, contact maintenance immediately.

8.2.2 Chamber



WARNING: PRESS EMERGENCY STOP BEFORE PROCEEDING.

- (a) Check whether all nozzles in the wash chamber spray manifold (Lower Ring are the wash nozzles and Upper Ring are the rinse nozzles) spray correctly. Clean clogged nozzles. When cleaning the nozzles, the recommended method is to remove them one by one and clear them up. If that is not possible, a small screwdriver or another pointed object might do the job. Be careful that the mouthpiece of the nozzle is not damaged or scratched.

8.3 Monthly Maintenance

8.3.1 Utility Room



WARNING: PRESS EMERGENCY STOP BEFORE PROCEEDING.

- (a) Clean the water regulator strainer if applicable. You must shut off the water supply before proceeding.
- (b) Drain supply Tank; check probes and temperature sensors inside the supply tank for build up. Clean if necessary. Follow proper refill procedure.

8.3.2 Door Seals



WARNING: PRESS EMERGENCY STOP BEFORE PROCEEDING.

- (a) Visually inspect the black door edge seal and the Teflon edge for cuts. The seal must be replaced if sealing surface is compromised allowing water to leak out.
- (b) Visually inspect the gray seal around door hinges. The seal must be replaced if sealing surface is compromised allowing water to leak out.
- (c) Visually inspect the gray “D shape” perimeter seal in the inside doorframe. The seal must be replaced if sealing surface is compromised allowing water to leak out.

8.3.3 Chamber



WARNING: PRESS EMERGENCY STOP BEFORE PROCEEDING.

- (a) Check the spray manifold cables for fraying. Notify Maintenance if necessary.

9. Parts List

9.1 Electrical Cabinet

9.2 Pneumatics Manifold

9.3 Queuing, In-feed and Unloading Conveyors

9.4 Transport Conveyors (Wash and Drying)

9.5 Lifting Flaps (DS and CS)

9.6 Door Mechanism (DS, Center and CS)

9.6.1 Door

9.6.2 Door Operator

9.7 Tilt Mechanism (Wash and Drying)

9.8 Chamber Lighting (Wash and Drying)

9.9 Wash Chamber

9.9.1 Chamber Screens

9.9.2 Exhaust Fan

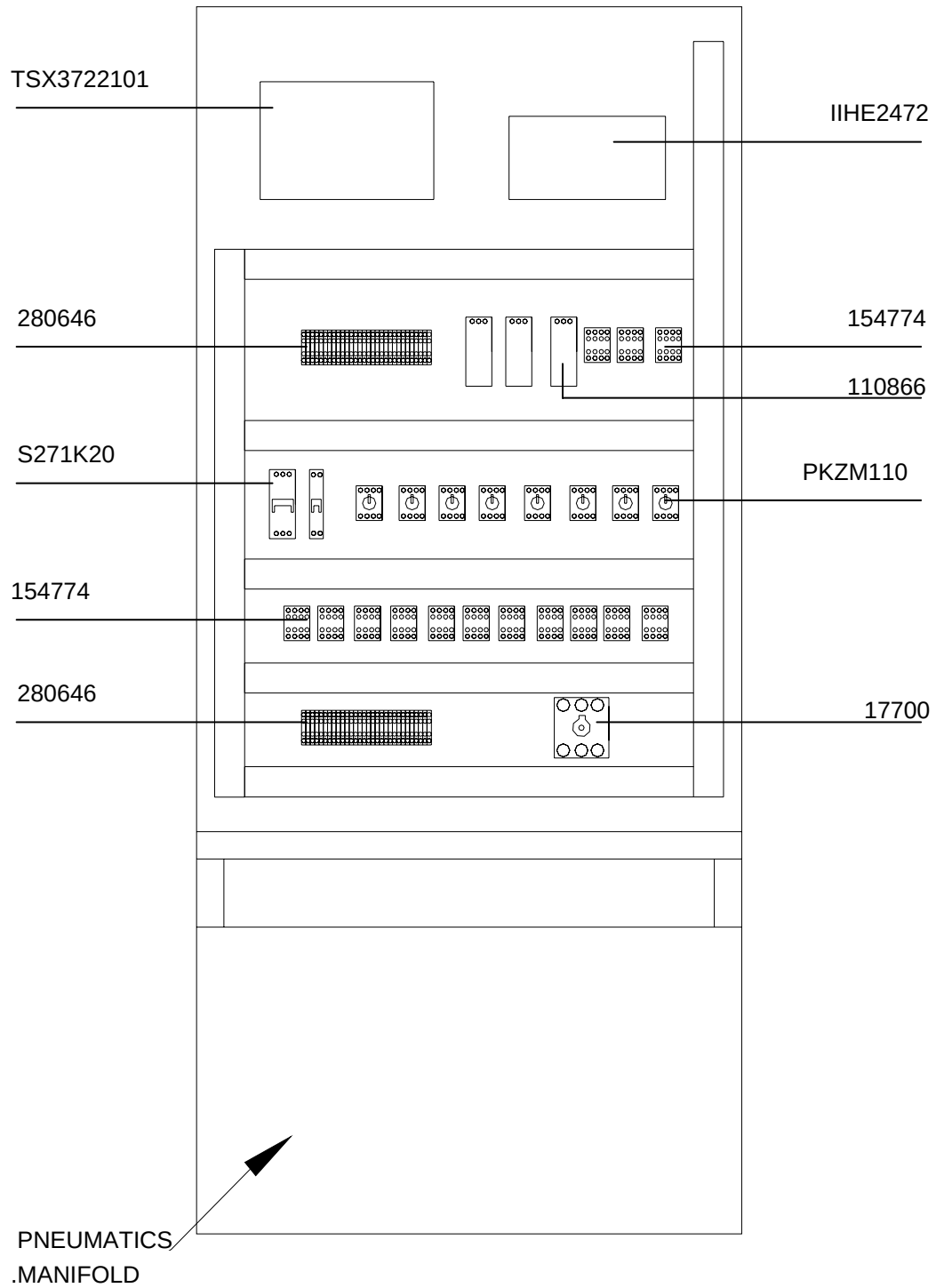
9.9.3 Spray Ring

9.9.4 Hoist Mechanism

9.10 Drying Chamber Air Re-circulation System

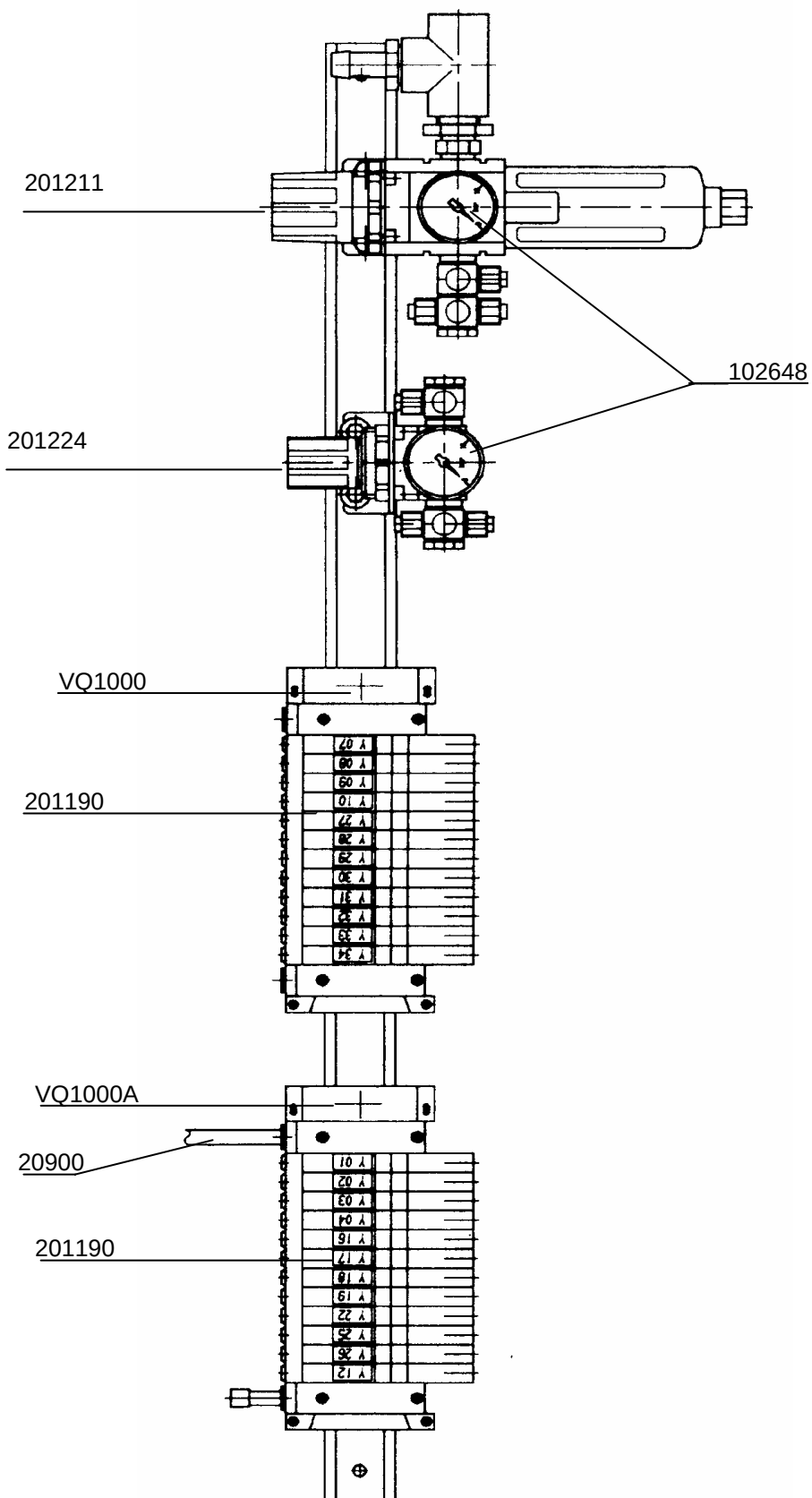
9.11 Wash and Rinse Supply Tanks

9.1 Electrical Cabinet



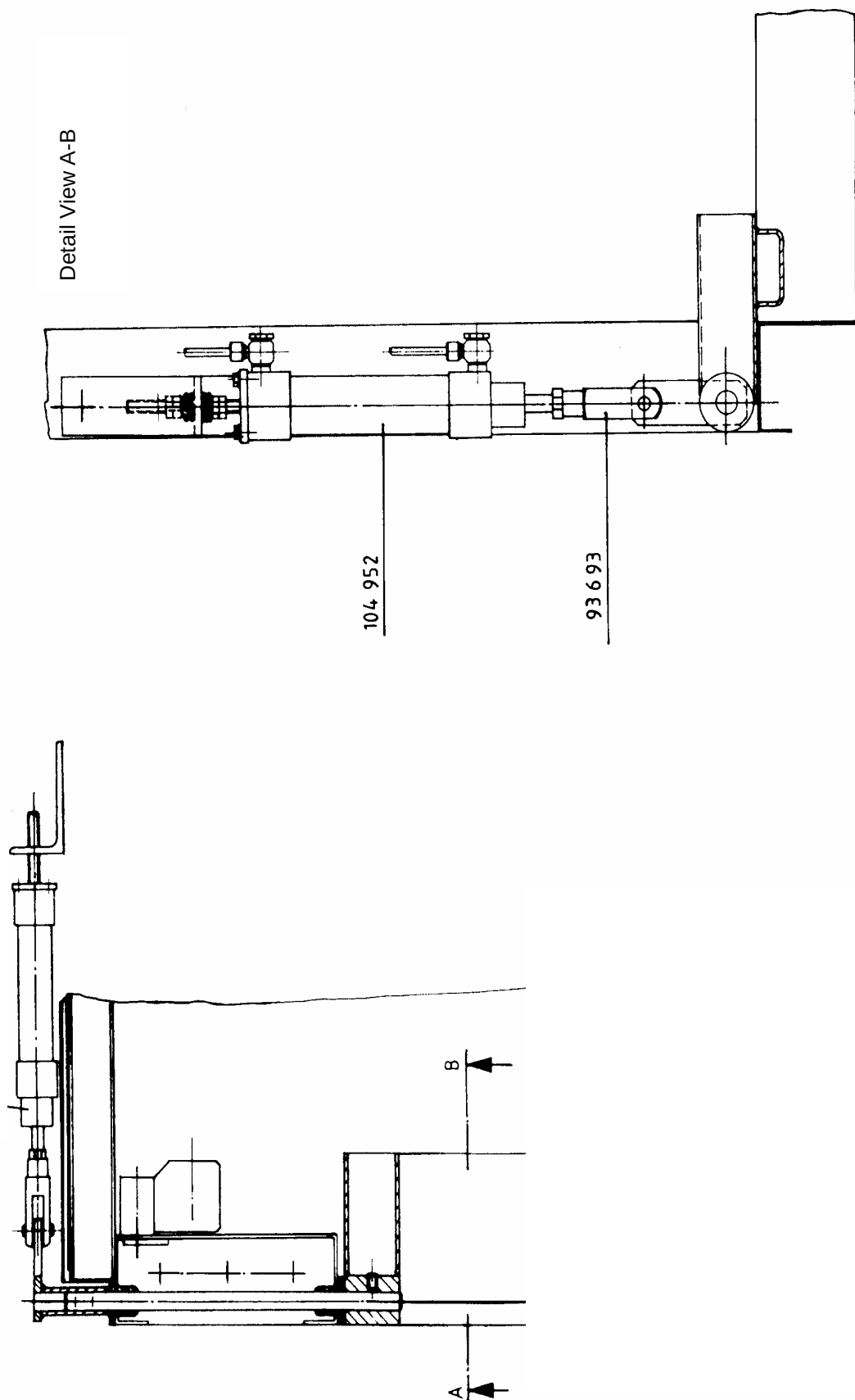
Item number	Name	Annotation
TSX3722101	Process Control	24VDC.
IHE2472	Power Supply	208V-24VDC, 7.2A
S271K20	Breaker, 20 Amp	
280646	Terminal Block, 2x2	
154774	Contactor, blower& hoist ES387	
110866	Relay, Dosing pump ES387	
PKZM110	Breaker, Adjustable 1-10amp	
17700	Switch, Main power ES387	

9.2 Pneumatic Manifold



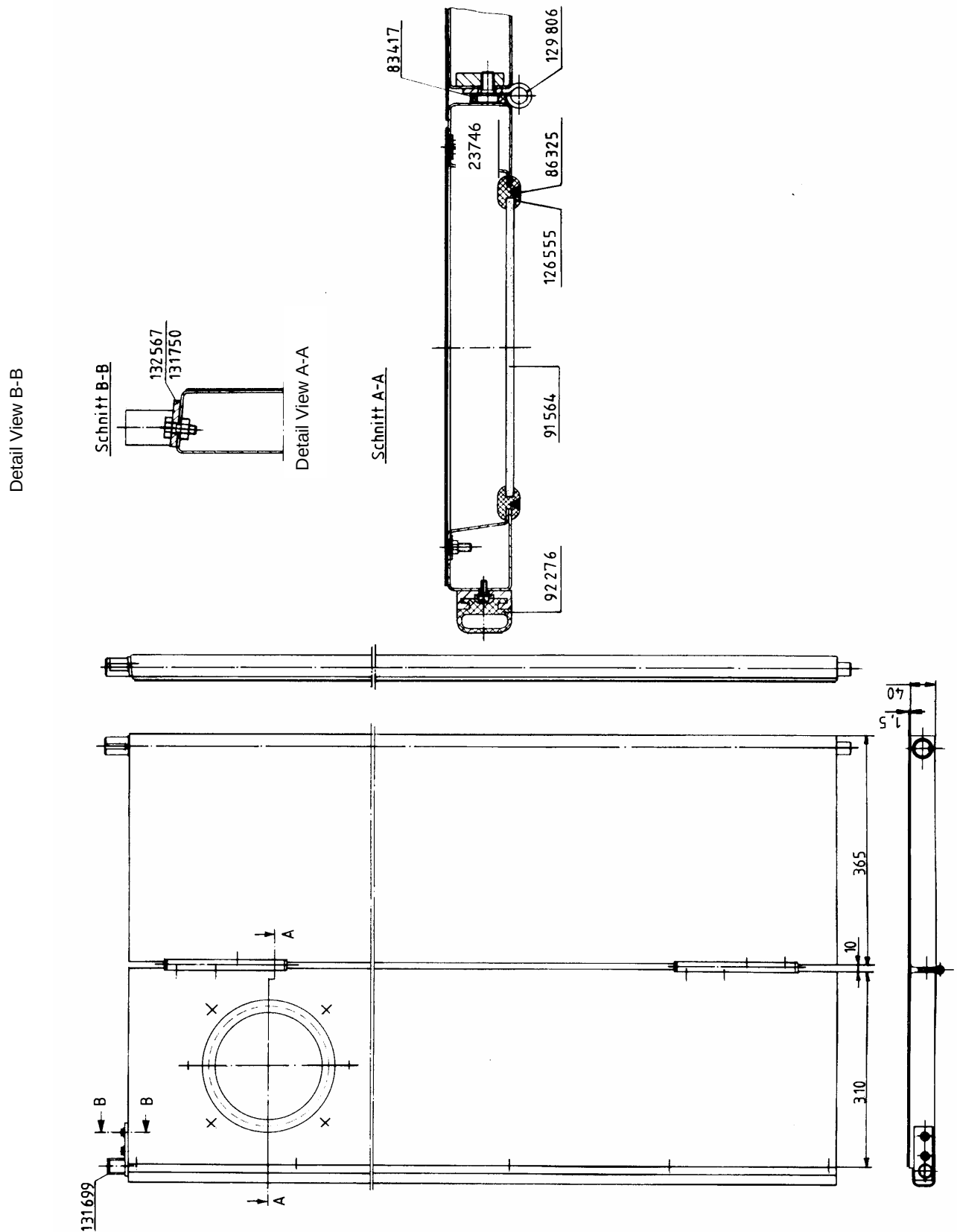
Item number	Name	Annotation
20 900	Hose (typical)	PE 8x1 PK 6 blue
201 190	5/2 way valve group	12 fold
201 211	Regulator, Air Primary ES387	
201 224	Regulator, Air secondary ES387	
102 648	Gauge, Air 1/4npt ES387	
VQ1000	Manifold, Pneumatic ES387	with block plate
VQ1000A	Manifold, Pneumatic ES387	without block plate

9.3 Lifting Flaps (DS and CS)



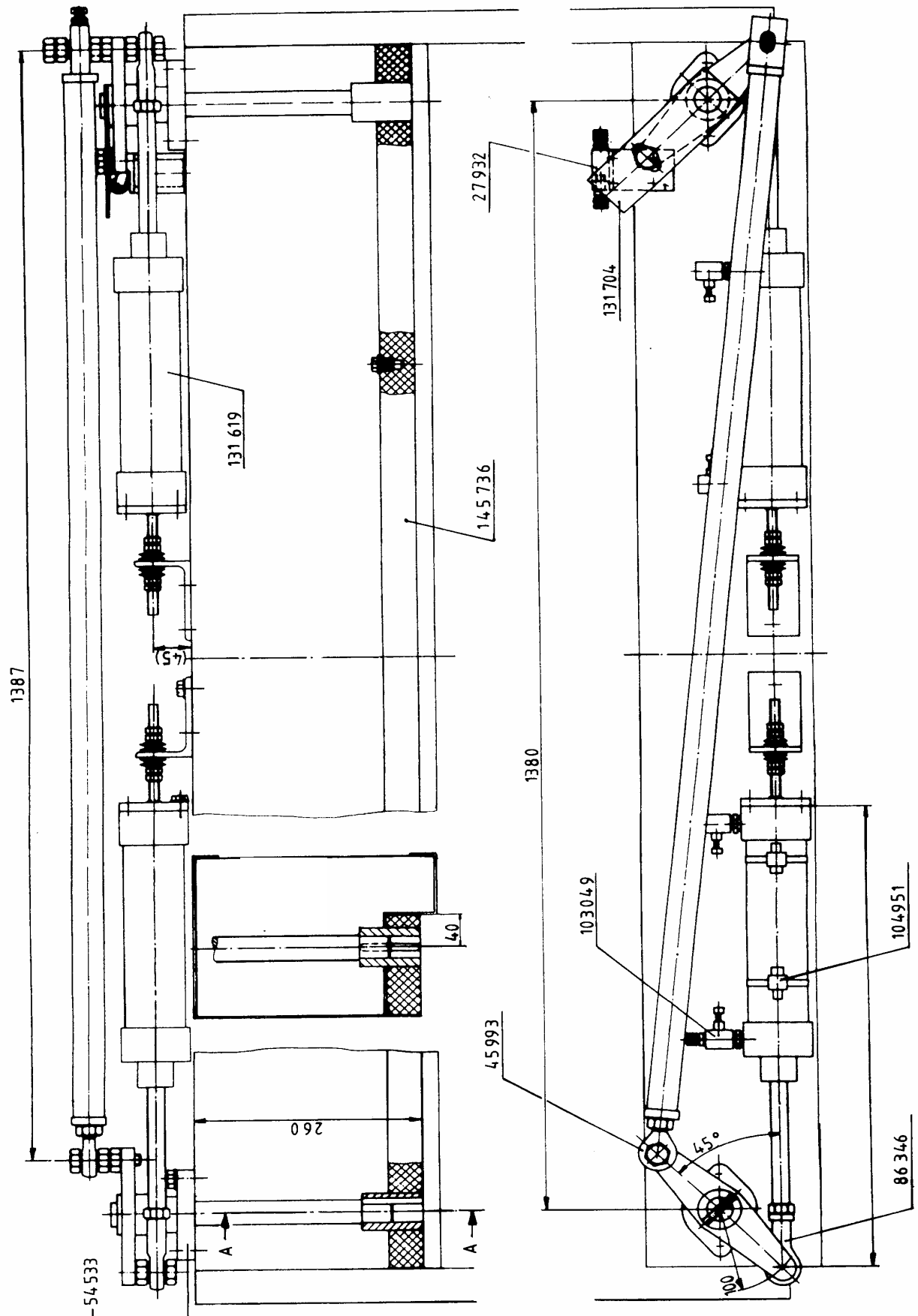
Item number	Name	Annotation
93 693	Linkage, connecting end	G 10x40
104 952	Piston, lift pneumatic ES387	D 32, stroke 100

9.4 Door Mechanism (DS and CS)



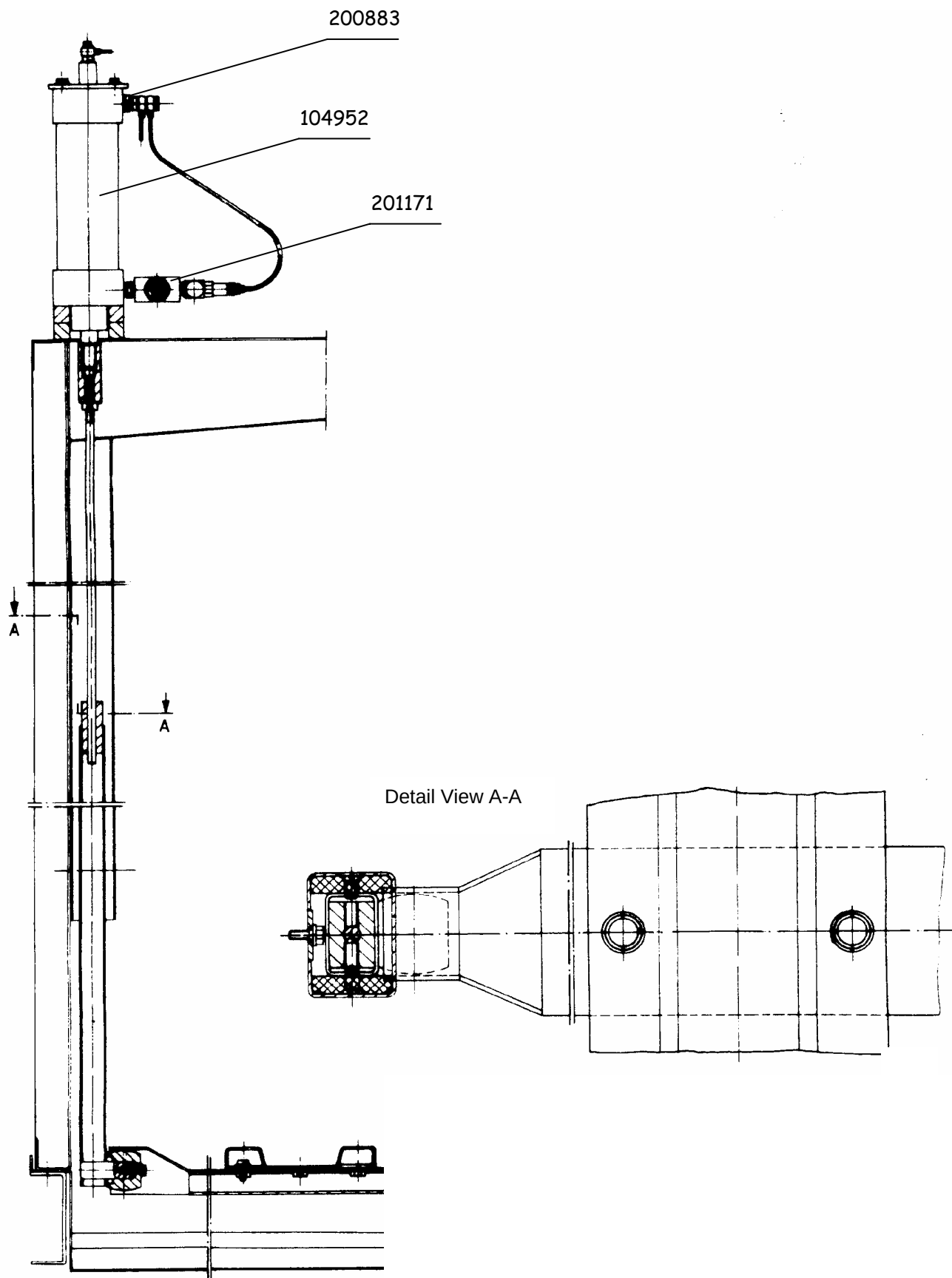
Item number	Name	Annotation
83 417	Gasket, Door Hinge	Rubber sponge 20 x 10
23746	Gasket, Window Pane	Filler profile
91 564	Window pane	Rd. 190 x 5 long
92 276	Gasket, Door Edge	35 x 22
126 555	Gasket Window Pane	
129 806	Door hinge	
131 699	Bushing, Door	22 x 1 Pipe PTFE - natural
131 750	Door Guide	Right side
132 567	Door Guide	Left side

9.5 Door Operator



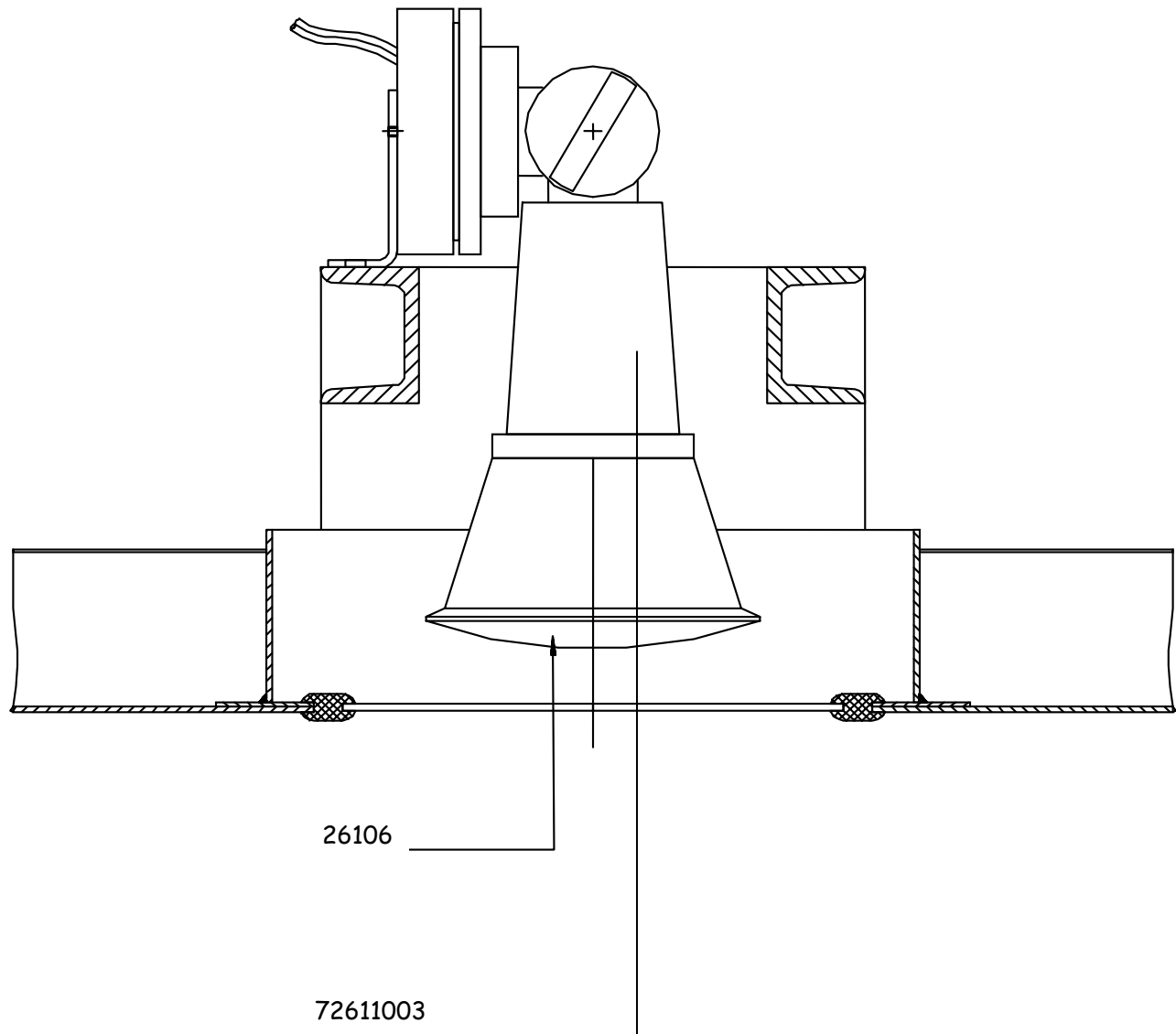
Item number	Name	Annotation
27 932	Valve, Air ES387 door booster	
45 993	Hinged head	with outer thread M 16x2
54 533	Bearing, Hoist assembly ES387	
86 346	Hinged head	with inner thread M 16x1.5
103049	Throttle valve, Piston ES387	R1/4"
104 951	Switch, Reed piston ES387	
131 704	Switch element	
131 619	Piston, door pneumatic ES387	D 63, stroke 200
145 736	Guide, door track ES387	

9.6 Tilt Mechanism (Wash and Drying)



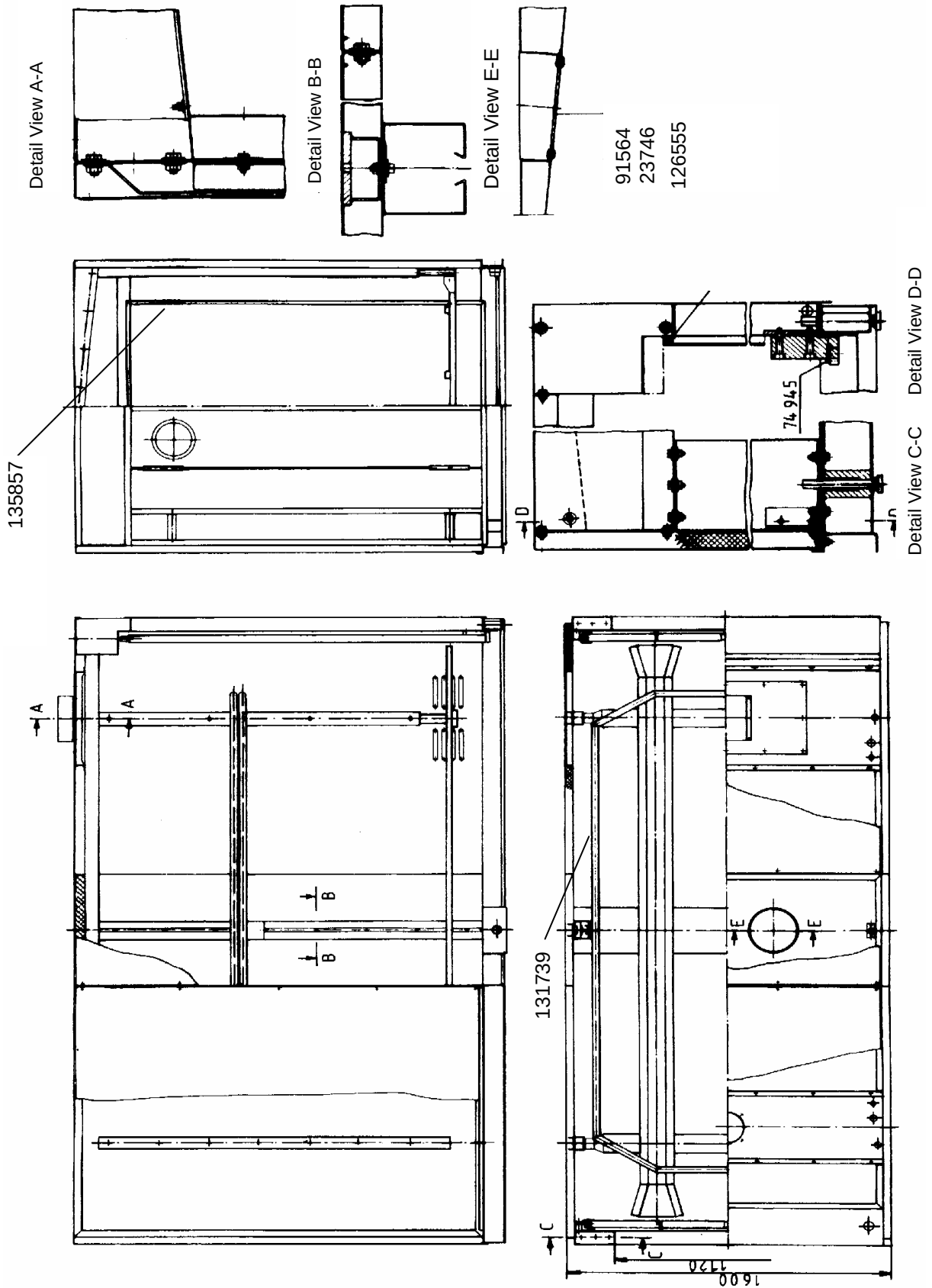
Item number	Name	Annotation
104952	Piston, Lifting	
200 883	Read switch, Piston	
201 171	Throttle valve, Piston	

9.7 Chamber Lighting



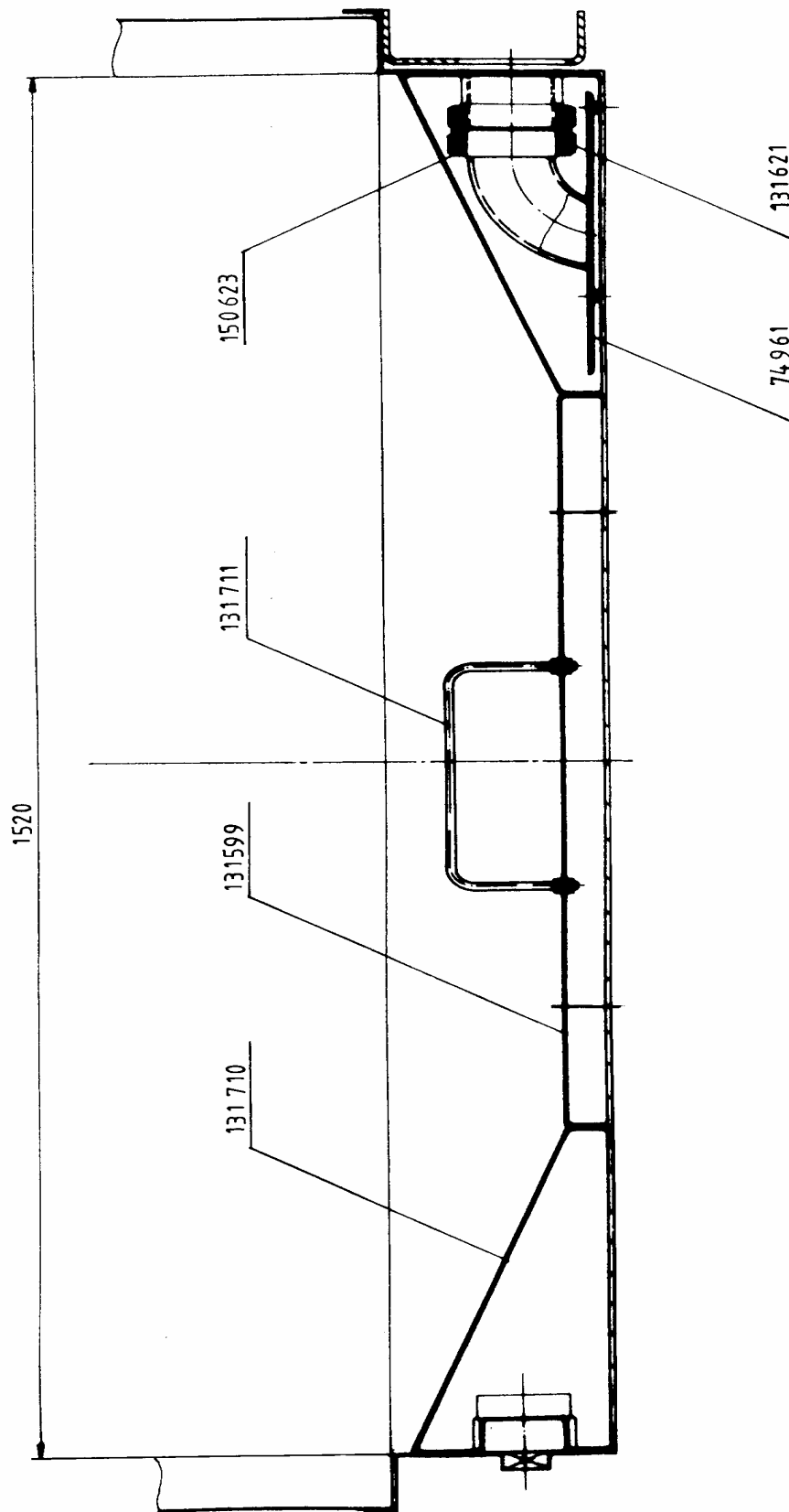
Item number	Name	Annotation
72611003	Light, Ceiling mounted spot	
26106	Bulb, Flood 220V	

9.8 Wash Chamber



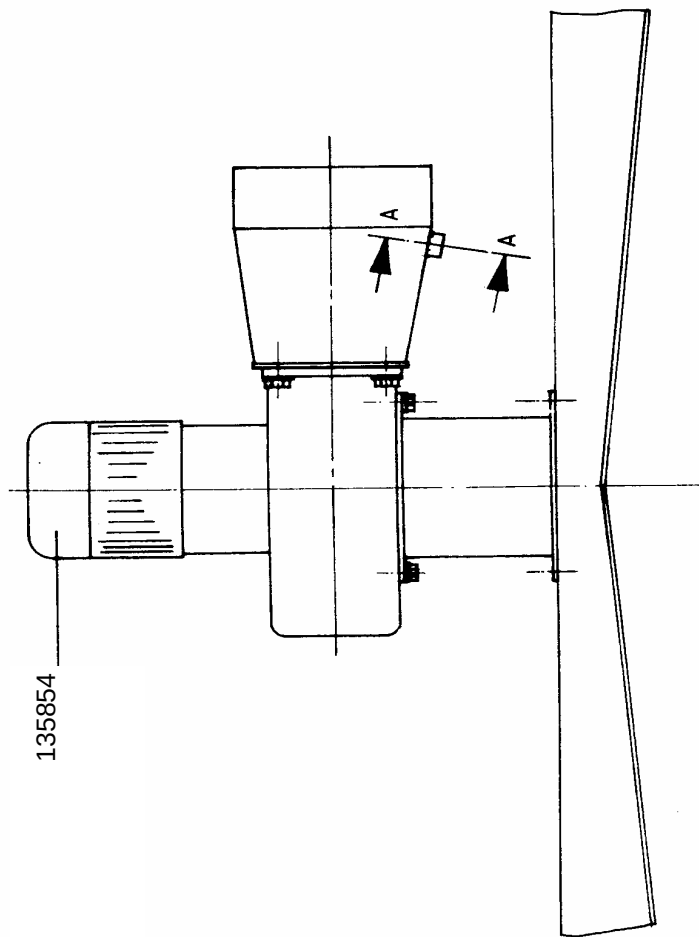
Item number	Name	Annotation
74 945	Bearing, Door	Rd. 40 x 22 long
126555	Gasket, Window Pane	Perimeter
23746	Gasket, Window Pane	Filler profile
91564	Window Pane	
135 857	Gasket, Door	Rubber sponge 17 x 22,5
131 739	Spray Ring	

9.8.1 Chamber Screens

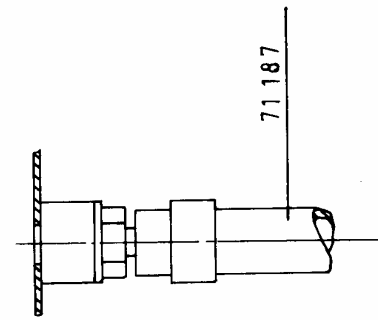


Item number	Name	Annotation
74 961	Suction plate	
131 599	Screen Stainless Steel	at center
131 621	Hose Clamp	D. 30
131 710	Screen Stainless Steel	Angled
131 711	Handle, Interior screen ES387	
150 623	Hose for suction plate 2" x 2"	ID = 50 x 50 mm

9.8.2 Exhaust Fan

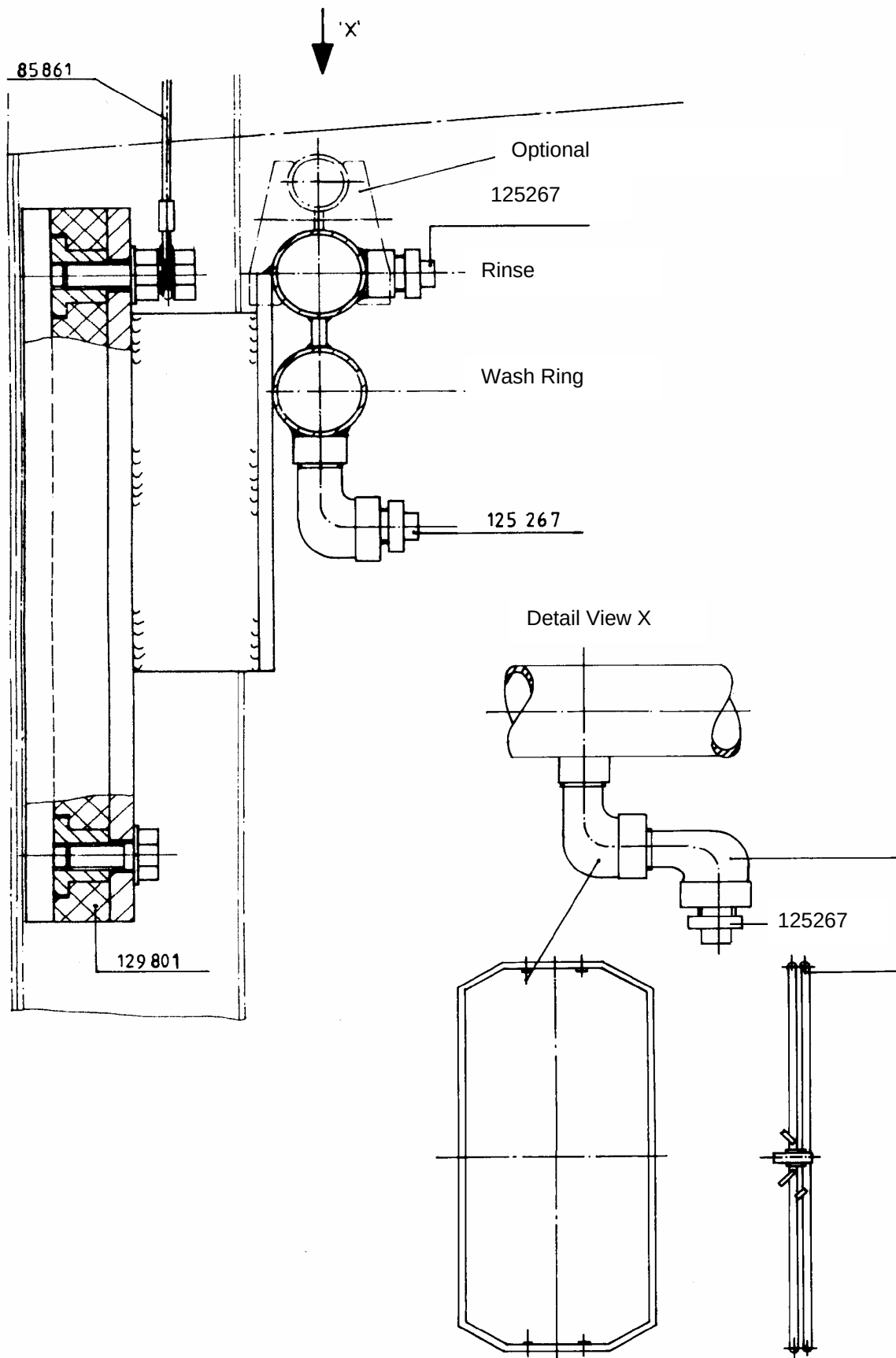


Detail View A-A



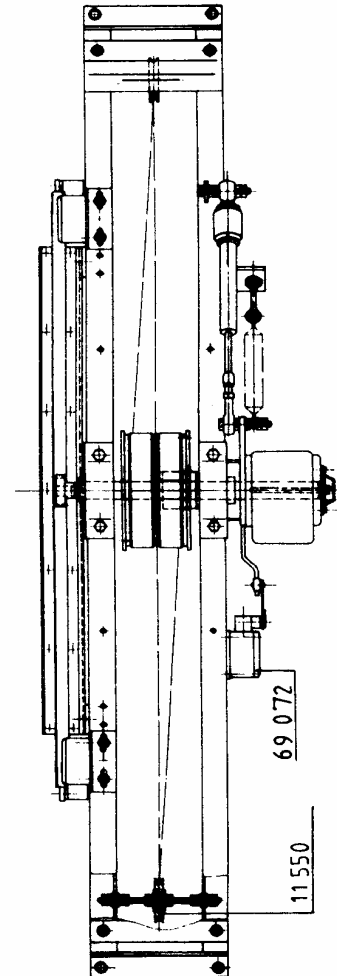
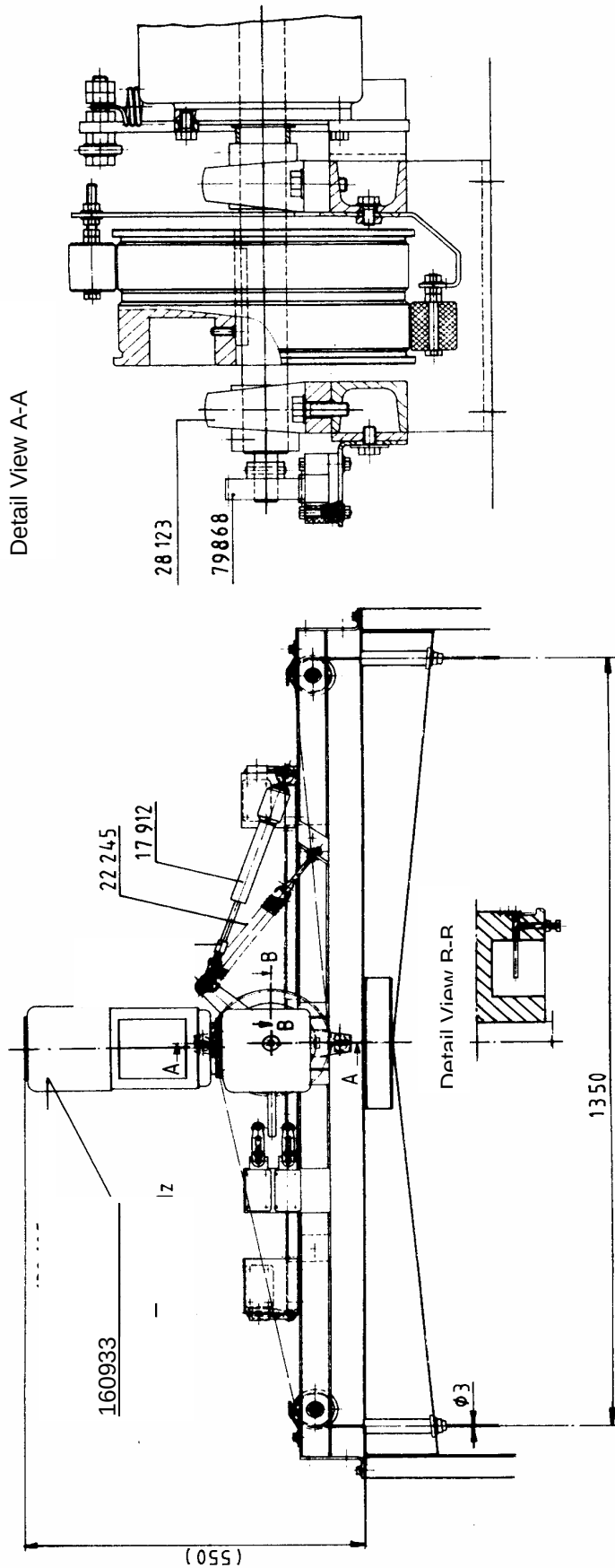
Item number	Name	Annotation
135854	Blower Motor, w/housing	208V, 60Hz.
71 187	Drain Connection	for condensate

9.8.3 Spray Ring



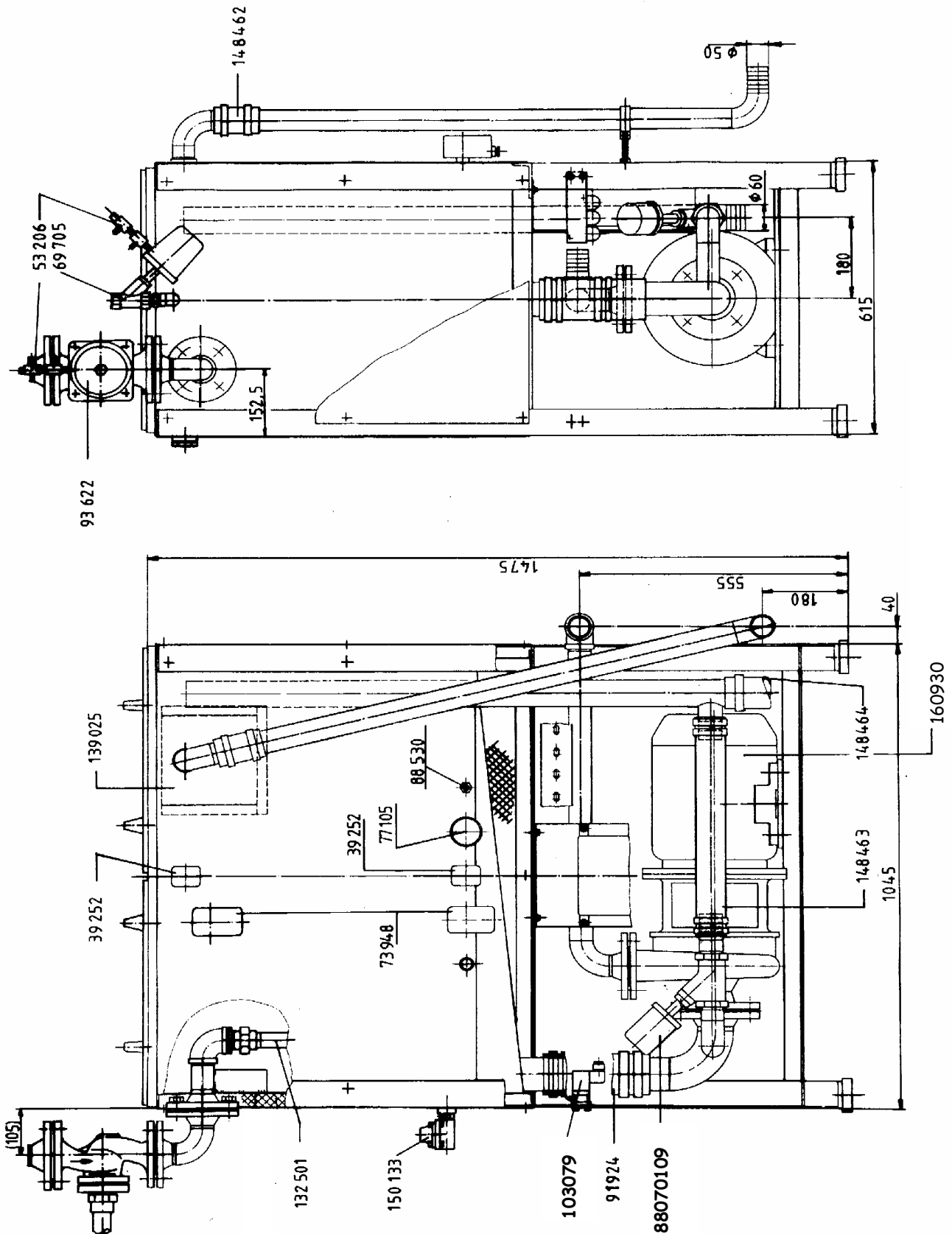
Item number	Name	Annotation
85 861	Cable, Spray ring	Stainless steel
125 267	Spray Jet	90 °
129 801	Guide. Spray ring	RCH 1000

9.8.4 Hoist Mechanism



Item number	Name	Annotation
11 550	Pulley, Spray ring Cable	with ball bearing
17 912	Shock Absorber	
22 245	Spring, Tensioning	
28 123	Bearing, Hoist motor	
69 072	Switch, Limit	
79 868	Sprocket, Hoist motor	
160 933	Motor, Hoist Assembly	208 V, delta 60 Hz

9.9 Wash and Rinse Supply Tanks



Item number	Name	Annotation
39 252	Sensor, Tank Water Level ES387	
53 206	Flow control, Air 1/4fpt ES387	
69 705	Valve, Water ES387 3/4"	R 3/4" NW 20
73 948	Sensor, Tank Temperature ES387	R 1/2"
77 105	Thermometer, 0-120c ES387	
88 530	Check valve, ES387 Chemicals	R 1/4"
91 924	Hose, ES387 pump 3id x 8-1/4	
93 622	Valve, Steam 2" w/flange ES387	DN 40
88070109	Valve, drain/water ES387 1.5"	R 1 1/2"
132 501	Steam coil, ES387 supply tank	
139 025	Filter box	
148 462	Hose, ES387 Overflow 2id x 5- 1/2"	ID = 50 x 140 long
148 463	Hose, ES387 Drain 2id x 20"	ID = 50 x 500 long
148 464	Hose, ES387 Drain 3id x 12"	ID = 60 x 300 long
150 133	Steam Trap, 3/4"fpt ES387	R 3/4"
160 930	Pump, Wash	208 V, delta 60 Hz
103079	Valve, Air ES387 supply tank	

10. Diagrams

10.1 Electrical

10.2 Plumbing

10.3 Air Re-circulation

10.4 Pneumatic